



Heavy Weight (9-12) Lesson

This sample project shows how you can engage students in a given topic, develop inquiry and problem-solving skills, and increase their understanding of how to apply science in real-world situations.

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Students gather data to explore the problem of adolescent obesity and develop potential solutions based on the observations they have made at their school.

Duration: 6-8 weeks for this lesson (45-60 minutes weekly); length variable if extensions used.

Learning Goals

- Practice the problem-solving process, including crafting and considering questions and key factors, making observations, recording data, analyzing data, communicating results, and planning further investigations
- Measure using tools such as scales, tape measures, and calipers
- Keep journals and/or log records of scientific investigations
- Apply mathematical weight concepts
- Compare results and draw conclusions
- Materials/Technology Needed
- USDA Food Pyramid
- My Pyramid Data sheet
- PBL Planning Form
- Data/statistics about health and weight for local area
- Weighted scales
- Measuring cups
- Clear rulers and/or plastic tape measurers (centimeter)
- Journals or learning logs
- Preparation

In this lesson, students will consider the problem of adolescent obesity. Here are specific steps to take as you plan this activity:

- As preparation, the instructor should familiarize herself or himself with the issue, as well as inform school cafeteria staff and/or school/district nutritionist of planned activities.
- Research the topic by obtaining current scholarly and popular articles in the media about nutrition, the impact of food intake on health and weight, and foods/ingredients recommended for health (reasons provided should vary).
- Organize materials in team folders (one for each team), rulers, tape measure, pencils or pens, learning logs, calculators, scales, metric conversion charts.
- Create a plan for storing all materials for the duration of the project.
- As this is a topic that is relevant to the larger community, elements of this activity can be used with as part of a community or family science night.
- Safety Considerations



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What to Do

Engage students by providing them with local and national statistics on adolescent obesity and its negative health impacts. Have students work in groups to determine the key elements of the problem that they will investigate.

Explore by having each group work through the steps below in problem solving/project based learning. Tell each group that one person should be the Reporter, and be responsible for generating the final report based on the group's findings. The reporter will also facilitate the group presentation.

Each group's tasks:

- Learn about the problem through research. Prepare a list of questions or issues related to adolescent obesity that need to be researched and develop a research action plan for the group
- Develop and administer surveys. The group should do this by generating questions, testing them, and administering them to a population within the school (for instance, their grade or a given class). The survey should assess students' eating habits.
- Identify the food and food types most frequently consumed by students as determined by the survey results.
- Conduct analysis of the nutritional value of the top-ranking foods by checking the nutrition facts on the foods, or by other means.
- Decide which information collected by the surveys is useful in helping to solve the problem.
- Propose a solution. Prepare a presentation of that solution, including why it might work and how the data gathered supports it.

Explain that the steps involved in this process are equally important in yielding the results. Students should complete data charts based on their research which relate directly to the questions they identified at the start of the project. After these are complete, each team will report their results along with these charts. The reporter should take the lead.

Extend learning if time allows. Here are a few ideas of extensions for this activity:

- Extend the project to include analysis and writing. Students could analyze the results, and then develop a written report or newsletter proposing solutions that can be distributed to all students.
- Expand the research component by having students obtain popular diets, and having them determine if such diets would help create a solution to the problem.
- Students could look at obesity figures for other age groups (for instance, younger students, adults of various ages) as well as obesity figures for other countries.
- Evaluate (Outcomes to Look For)
- Students complete their journals or learning logs correctly with accurate data tables and charts



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- Students are engaged in the problem-solving process and use appropriate steps to develop and test hypotheses
- Students collect data objectively and accurately
- Students record data with the proper units (for instance, ounces, serving size)
- Students compare and contrast their data appropriately and present it clearly in charts or other formats
- Students work responsibility and appropriately in their groups

5E's Instructional Model

Use the 5E's instructional model as a format for lessons that build on what students already know. Each phase of the learning sequence can be described using five words that begin with "E": engage, explore, explain, extend, and evaluate. Adapted from SEDL, http://www.sedl.org/afterschool/toolkits/science/tk_5Es.html.

- Learning Phase
- Student's Roles
- Teacher's Roles
- Engage/Excite

Students are introduced to the concept. Students make connections to prior knowledge and what is to be studied. Student thinking is clarified. Students become mentally engaged in the new learning experience.

Teachers ask questions of students and engage them in the guided inquiry lessons. They use strategies such as KWL (PDF, 56K) that make connections between the past and present learning experience. Teachers set a level of anticipation.

Explore

Students explore or experiment at this point. They engage in observations, use science tools and materials (manipulatives), collect data, and record data. Teachers set up the investigation and guide students in inquiry, asking probing questions to clarify understanding.

Explain

Students verbalize their understandings from the "explore" phase, look for patterns in their data, and describe what they observed. This can be done in small and/or whole groups. Teachers ask probing questions that encourage students to look for patterns or irregularities in their data.

Extend

Students expand their learning, practice skills and behavior, and make connections or applications to related concepts and in the world around them. Teachers provide learning opportunities for students to apply their knowledge and to gain a deeper understanding. Activities can include reading articles and books, writing, designing other experiments, and exploring related topics on the Internet.



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Evaluate

Students answer questions, pose questions, and illustrate their knowledge (understandings) and skill (abilities). Teachers diagnose student understanding through an ongoing process. Assessment can be both formative (ongoing and dynamic) and summative (end-of-lesson final test or product).

The 5E's instructional model was developed by the Biological Sciences Curriculum Study.

Adapted content from SEDL:

http://www.sedl.org/afterschool/toolkits/science/pr_exploring.html.